I Claim:

1. A bypass turbofan engine comprises a first propulsion system and a second propulsion system, the first propulsion system comprises a first fan rotor, a core engine, a first low pressure turbine and a first fan shaft drivingly connecting the first turbine and the first fan rotor, the second propulsion system comprises a second fan shaft drivingly connecting to a second fan rotor, the second fan shaft is drivingly connected to the first propulsion system characterised in that the first and second shafts are not coaxial with one another.

2. A bypass turbofan engine as claimed in claim 1 wherein the second fan system comprises a second low pressure turbine drivingly connected via the second shaft to the second fan rotor, in operation, a fluid flow from the core engine flows drivingly through the first and second low pressure turbines.

3. A bypass turbofan engine as claimed in claim 2 wherein the engine comprises a third propulsion system, the third propulsion system comprises a third fan drivingly connected to a third turbine via a third shaft, the third turbine is arranged substantially in flow sequence with the first and second turbines and the third shaft is not coaxial with a shaft of another fan system.

4. A bypass turbofan engine as claimed in claim 3 wherein the turbines are arranged substantially in flow sequence in order first, second and third turbines.

5. A bypass turbofan engine as claimed in claim 1 wherein the core engine comprises, in flow sequence a core compressor, a combustor and a core turbine, the core compressor is drivingly connected to the core turbine via the first shaft.

6. A bypass turbofan engine as claimed in claim 1 wherein the core engine comprises, in flow sequence a core compressor, a combustor and a core turbine, the core

compressor is drivingly connected to the core turbine via a core shaft, the shaft is coaxial with the first shaft.

7. A bypass turbofan engine as claimed in claim 1 wherein the first propulsion system comprises a core flow booster compressor is provided between the first fan rotor and the core engine and is drivingly connected to the first turbine by the first shaft.

8. A bypass turbofan engine as claimed in claim 2 wherein the second fan system further comprises a second compressor, a fourth turbine and a fourth shaft, the fourth shaft is coaxial with the second shaft and drivingly connects the core compressor and the fourth turbine.

9. A bypass turbofan engine as claimed in claim 8 wherein fluid flow from the core engine flows drivingly through the fourth turbine of the second fan system.

10. A bypass turbofan engine as claimed in claim 1 wherein the shafts are angled between 0-40 degrees relative to one another so that the shafts converge in the downstream direction.

11. A bypass turbofan engine as claimed in claim 1 wherein the shafts are angled between 10-30 degrees relative to one another so that the shafts converge in the downstream direction.

12. A bypass turbofan engine as claimed in claim 1 wherein the shafts are angled at approximately 20 degrees relative to one another.

13. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans are synchronised over at least part of the fans' speed range by means of at least one variable capacity turbine.

14. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans are synchronised over at least part of the fans' speed range by means of a variable area core flow nozzle.

15. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans can be

synchronised over at least part of the fans' speed range by means of at least one variable area bypass flow nozzle.

16. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans can be synchronised over at least part of the fans' speed range by means for bleeding air from at least one bypass duct.

17. A bypass turbofan engine as claimed in claim 16 wherein the means of bleeding air from at least one bypass duct comprises at least one variable area auxiliary bypass flow nozzle.

18. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans can be synchronised over at least part of the fans' speed range by means of a variable area mixer, the variable area mixer is disposed upstream of the core nozzle and in operation mixes part of the bypass air from at least one of the fans with the exhaust flow from the final downstream turbine.

19. A bypass turbofan engine as claimed in claim 1 wherein the rotational speeds of at least two fans are synchronised over at least part of the speed range of the fans by means of at least one set of variable pitch vanes.

20. A bypass turbofan engine as claimed in claim 19 wherein the at least one set of variable pitch vanes is disposed upstream of the final downstream turbine.

21. A bypass turbofan engine as claimed in claim 1 wherein the second fan system is driven by the first fan system by means of a gear-train configured to work in operative association with at least two shafts.

22. A bypass turbofan engine as claimed in claim 21 wherein the rotational speeds of the at least two fan rotors are synchronised by the gear-train.

23. A bypass turbofan engine as claimed in claim 21 wherein the gear-train is a low-power gear train configured to transfer only part of the power to drive the second fan rotor.

24. A bypass turbofan engine as claimed in any one of claims 21 wherein the gear-train comprises a mating pair of low angle bevel gears.

25. A bypass turbofan engine as claimed in claim 21 wherein at least one lay-shaft is drivingly connected at one end to the low power gear-train via an idler gear.

26. A bypass turbofan engine as claimed in claim 25 wherein the at least one lay-shaft is drivingly connected at its distal end to an accessory drive.

27. A bypass turbofan engine as claimed in claim 26 wherein the accessory drive is any one from the group comprising an electrical generator or a compressor.

28. A bypass turbofan engine as claimed in claim 5 wherein the core engine comprises a heat exchanger, the engine is arranged so that the airflow from the core compressor flows through the heat exchanger and into the combustor, the fluid flow from the combustor drivingly flows through the core turbine, the first turbine and the heat exchanger thereby increasing the heat of the airflow from the core compressor to the combustor.

29. A bypass turbofan engine as claimed in claim 5 wherein the engine comprises a heat exchanger, the engine is arranged so that the airflow from the core compressor flows through the heat exchanger and into the combustor, the fluid flow from the combustor drivingly flows through the core turbine, the first turbine and the second turbine and then the heat exchanger thereby increasing the heat of the airflow from the core compressor to the combustor.

30. A bypass turbofan engine as claimed in claim 6 wherein the core engine comprises a heat exchanger, the engine is arranged so that the airflow from the core compressor flows through the heat exchanger and into the combustor, the fluid flow from the combustor drivingly flows through the core turbine, the first turbine and the heat exchanger thereby increasing the heat of the airflow from the core compressor to the combustor.

31. A bypass turbofan engine as claimed in claim 6 wherein the engine comprises a heat exchanger, the engine is arranged so that the airflow from the core compressor flows through the heat exchanger and into the combustor, the fluid flow from the combustor drivingly flows through the core turbine, the first turbine and the second turbine and then the heat exchanger thereby increasing the heat of the airflow from the core compressor to the combustor.

32. A bypass turbofan engine as claimed in claim 28 wherein a first valve is located upstream and adjacent the heat exchanger and a second valve is located between the compressor and the combustor, the valves are operable to divert the compressor flow around the heat exchanger so that, in use, a desirable increase in engine power is achieved.

33. A bypass turbofan engine as claimed in claim 30 wherein a first valve is located upstream and adjacent the heat exchanger and a second valve is located between the compressor and the combustor, the valves are operable to divert the compressor flow around the heat exchanger so that, in use, a desirable increase in engine power is achieved.

34. A bypass turbofan engine as claimed in claim 8 wherein the engine further comprises a first chamber and a second heat exchanger, the first chamber is located between and is in fluid communication with the first fan and the core compressor, the second heat exchanger is adjacent the first chamber and is arranged to receive fluid from the second compressor through the heat exchanger, cooling fluid from the first fan passes through the heat exchanger to cool the fluid from the second compressor so that the core compressor compresses the fluid more efficiently.

35. A bypass turbofan engine as claimed in claim 34 wherein the second heat exchanger comprises valves, operable to open and close the second heat exchanger to fluid flows from the first fan and the second compressor so that, in

use, a desirable increase in engine power is achieved when the valves are closed and the engine is more efficient when the valves are open.

36. A bypass turbofan engine as claimed in claim 34 wherein the fluid passing through the heat exchanger from the first fan is ducted to and mixed with a fluid flow exhausting from the turbine and upstream of the final nozzle.

37. A bypass turbofan engine as claimed in claim 36 wherein the valves are operable to regulate the flow of fluid through the second heat exchanger to optimise efficiency at a desired engine output.

38. A bypass turbofan engine as claimed in claim 1 wherein a shaft is an angled shaft, the shaft comprising a forward portion and a rearward portion, the portions are drivingly connected via an angled drive and are arranged to minimise the angle between the forward portion and another shaft of the engine.

39. A bypass turbofan engine as claimed in claim 1 wherein the engine comprises a nacelle defining a bypass duct, the bypass duct comprises an inlet and a bypass exhaust nozzle, the bypass duct substantially surrounds and extends downstream of a fan rotor and transitions from a substantially circular cross-section to a part-ring shaped cross-section at its exhaust nozzle.

40. A bypass turbofan engine as claimed in claim 36 wherein the part-ring shaped cross-section is in the form of any one from the group comprising a lens, a horseshoe, a semicircle, a semi-elliptical or a super-ellipse shaped engine exhaust nozzle.

41. A bypass turbofan engine as claimed in claim 39 wherein the bypass duct is partly defined by pairs of bypass duct splitter walls that diverge generally in the axial downstream direction from a common leading edge, the divergence of the splitter walls defines the transition of the bypass duct from the substantially circular cross-section to an arcuate cross-section at its exhaust nozzle.

42. A bypass turbofan engine as claimed in claim 41 wherein the bypass duct comprises a set of axially staggered vanes disposed between the divergent splitter walls such that swirling air flow from the fan rotors along the splitter walls and through the bypass duct substantially retains the swirl from the fan rotors until the swirl is reduced by the set of stator vanes.